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The Preparation and Mounting of Foraminifera, with Description of a New Slide for Opaque Objects.

By F. M. Hamlin, M. D., Auburn, N. Y.

Nearly all of the Foraminifera are in condition to mount as found, but the principal difficulty is to obtain them in sufficient quantities, for mounting, free from the sand and other materials with which they are gathered. If in sand which is silicious, they may be quite easily separated by drying the whole mass thoroughly, and then pouring on water. The sand sinks readily, but the shells being filled with air float upon the surface of the water and may be skimmed off; or a small quantity of the sand may be placed in a watch glass and subjected to a whirling, shaking motion when the shells will work out on top and may be picked off.

These plans do very well for the coarse forms, but for the finest, and for calcareous sands, such as the famed Bermuda sand, there is no plan so satisfactory as to search through the material with the microscope.

To save time and labor I separate the sand into grades by passing it through sieves of different degrees of fineness. Three grades are sufficient, one coarse, medium and fine. The shells from the last will exercise the skill nearly as much as diatoms. Having sifted the sand I examine it on a specially devised slide, made as follows: A piece of pasteboard the size of an ordinary slide has a long slit cut in it and is then fastened to a glass slide. The width of this slit is of importance, and is determined thus, take a low power objective, say a three or four inch, which affords just sufficient power to see the shells well, and measure the width of its field. Make the slit, or opening in the pasteboard just twice this distance. The slide being ready, a little pinch of sand is put on the glass and a slight shake spreads it out in a single layer confined by the pasteboard. It is then placed under the microscope and moving it so the edge of the pasteboard is just visible, pass up one side and down the other and every particle of the sand is brought into view without loss of time in searching over the same portions many times, and perhaps entirely omitting other. It is surprising what a quantity of sand can thus be looked over in a short time, by this systematized labor.

Supposing the shells are clearly seen among the sand, how are we to get them? There is no royal road that I know of, they must be picked out singly. I use for this purpose a very fine needle set in a suitable handle. The point of the needle is dipped in turpentine and when a shell is touched by it, it adheres and may be lifted out and deposited in a small vial, or upon the slide where it is to be mounted. I have a board about 6 by 10 inches, and 1 inch thick, in which rows of holes are bored nearly through. In these holes little half dram vials are placed. The vials are labeled with the names of the different species of Foraminifera, and when a shell is found it is picked up as described above, and with a little flip of the needle against the neck of the appropriate vial it is shaken off and preserved for future use. Sometimes I put all I find into one vial and then sort them out into their respective vials at my leisure. In place of the needle used as above, I sometimes employ a very small camel's hair brush moistened and drawn to a delicate point by the lips. This is perhaps best for very delicate shells which might be broken by the needle. Of course these manipulations will be difficult to the beginner till he learns how to use the needle under the objective, for he must remember every thing is reversed from what it appears.

The shells being obtained, how shall they be mounted? Very many of the species of Foraminifera, especially the younger shells, become so transparent when immersed in turpentine or balsam that they may be viewed by transmitted light. To mount them in balsam, the shells should be soaked in terpentine till all the air is driven out of the cells. Then they may be transferred to a slide with a cell deep enough to keep the cover glass from resting on them and which is filled with *thin* balsam. In this they can be arranged in position to display them properly. The slide should then be put away to permit the balsam to harden. Care should be taken to keep out the dust and that the balsam does not dry away from the shells and permit the exposed portions to fill with air. When the balsam has hardened a drop of turpentine may be spread over the top and a fresh coating of balsam added. This may be repeated till the cell is full when with the last coat, or layer, of balsam the cover glass may be put on. This process may be greatly facilitated by the use of heat, but care is necessary to retain the shells in position, and such slides should be left lying flat.

Such mounts well repay the time and labor required in their preparation for they not only serve for study with transmitted, but with reflected light. Some species exhibit their structure beautifully when viewed as apaque objects when mounted thus.

The most ready, and the most common way to mount these objects is to place them dry in cells as apaque objects. For the purpose of study, or to make a systematic collection, it is best to mount several of one species only upon a slide, arranging them so as to show different stages of growth, difference of form, etc. To fasten them to the bottom of the cell, I first make a little dab of cement, using either stratena or liquid marine glue, upon the spot I design to place the shell with the point of a sharpened match. Care should be taken not to get on too much cement or it will penetrate the shell or form an unsightly mass surrounding it. Then I take up the shell with the forceps, or with the needle wetted by turpentine, as before described, and put it in place.

Not being satisfied with the ordinary slides and cells for this class of objects, I have devised a slide which serves the purpose admirably, it is made as follows: The slide itself is of wood of the ordinary size and about $\frac{1}{10}$ inch thick. Through its center is bored a hole ½ inch in diameter, over the back of this is pasted a strip of stout paper. The hole in the slide with the paper back constitutes the cell. In the bottom of the cell is pasted a disk of colored paper, cut with a gun-wad punch, to serve as a back ground for the "mount." To give a neat finish a brass curtain-ring which just fits in the hole is fastened in with a bit of cement. The edges of the slide are now bound or covered, with a bit of colored tissue paper. The shell may now be arranged in the cell, and the cover glass dropped in upon the brass ring, the top of which has been covered with cement. A suitable label, the whole size of the slide is now pasted on the front, and a plain one may be put on the back.

Should a shell be very rare and it is desirable to show both sides, a piece of thin glass may be let into the back of the slide, and the curtain-ring placed upon this instead of the paper back ground. Such a slide would need a hole in the back as well as in the front label.

When these slides are finished with pretty and suitable labels they make a fine appearance, pack and carry as easily as so many slips of wood, and if made of white bass wood do not warp. The porosity of the wood prevents any accumulation of moisture upon the cover glass, and upon the whole, these slides are very satisfactory.

I wish to call attention to the desirability of using some other color for the back ground of apaque "mounts" than black. After much experimenting with various colors, I have settled upon that afforded by a pigment called "crimson lake." I use either this or a piece of glazed paper of the same color. When the object is white, or nearly so, I use this color exclusively, but when it has some decided color select that which seems to show it best. It may be a fancy, but I think any one who will take the trouble to experiment a little in this matter, will feel repaid by the improved appearance of the objects and the greater comfort in studying them.